


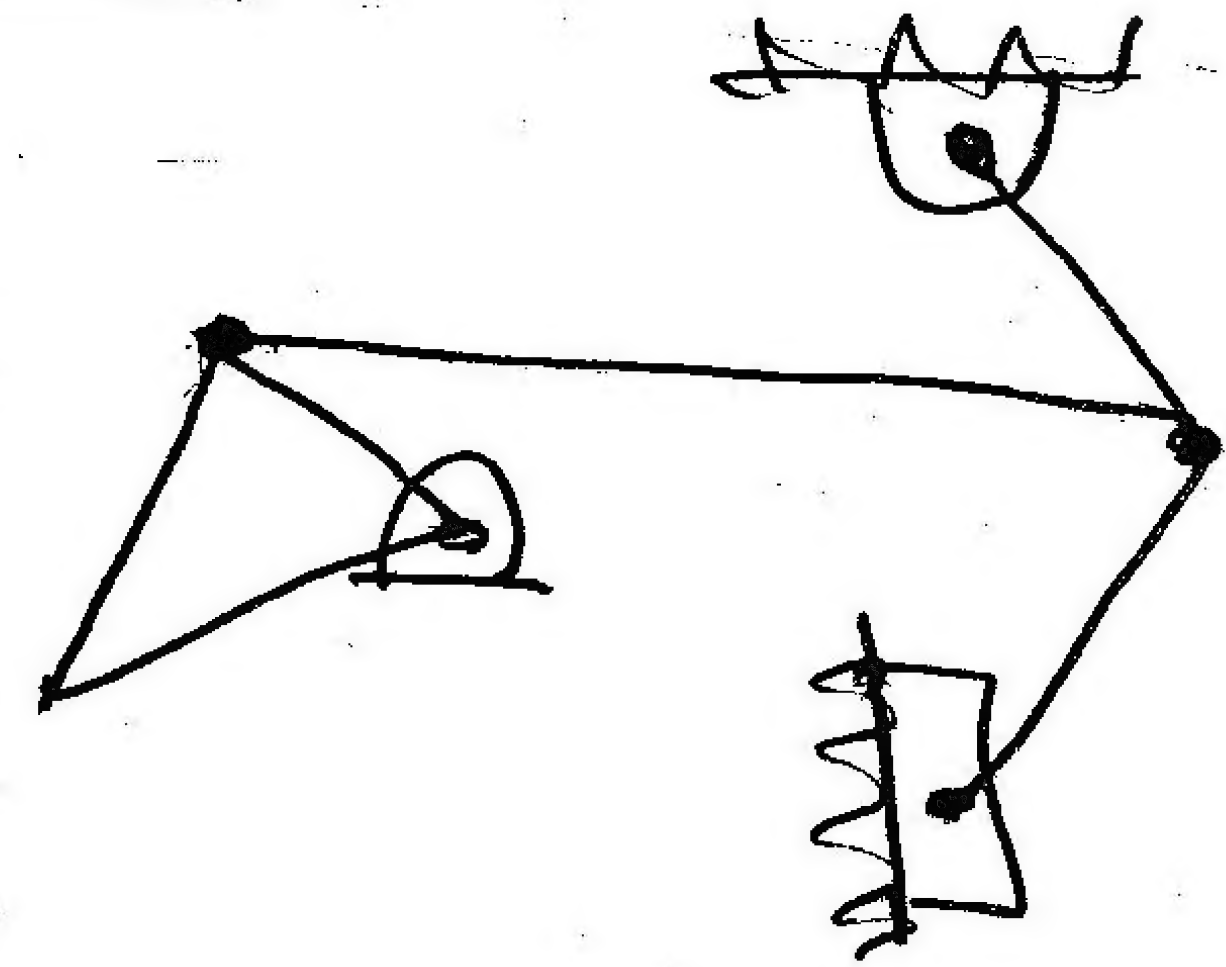
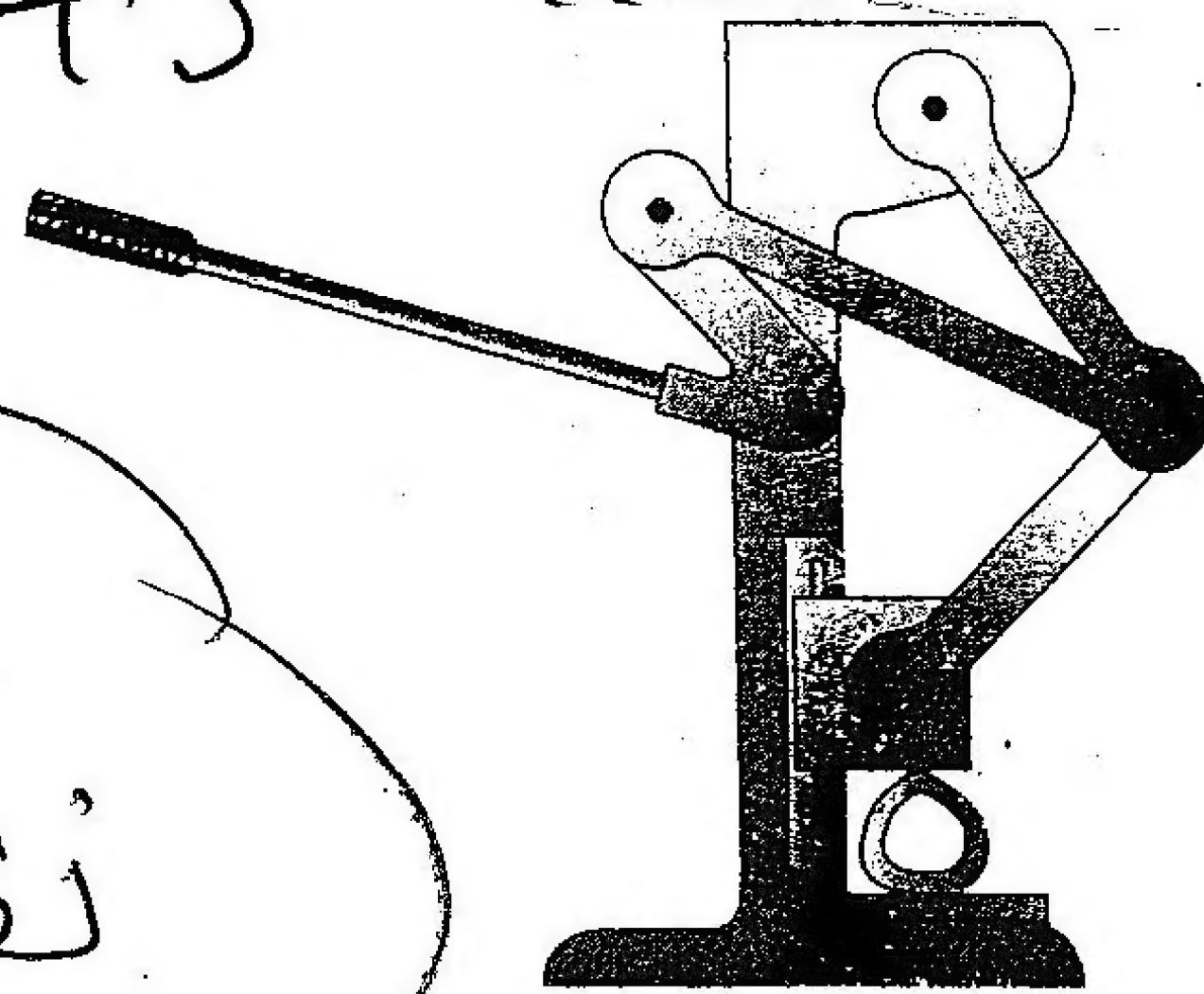
هندسة الميكاترونكس	التخصص والمستوى :		دولة فلسطين
نظرية الآلات الميكانيكية	اسم المساق :		وزارة التربية والتعليم العالي MINISTRY OF EDUCATION & HIGHER EDUCATION
٢٠١٣-٥-	تاريخ الامتحان :		جامعة فلسطين التقنية "خضوري" الفصل الثاني ٢٠١٢-٢٠١٣ الامتحان الاول
ساعة	زمن الامتحان :	م. مهنا عبيد	

Q1. The Figure below shows a device that can be used to exert large forces to insert a small part into a large one . Draw the kinematic diagram showing all the links and joints.  
Calculate the degrees of freedom ( mobility ) for this mechanism.

8 marks

$$n = 6 \quad f = 1$$

$$\phi = 7$$



الامتحان الأول  
نظرية الآلات

Q2. A mechanism to spray water onto vehicles at an automated car wash is shown below.

1- Draw the kinematic diagram.

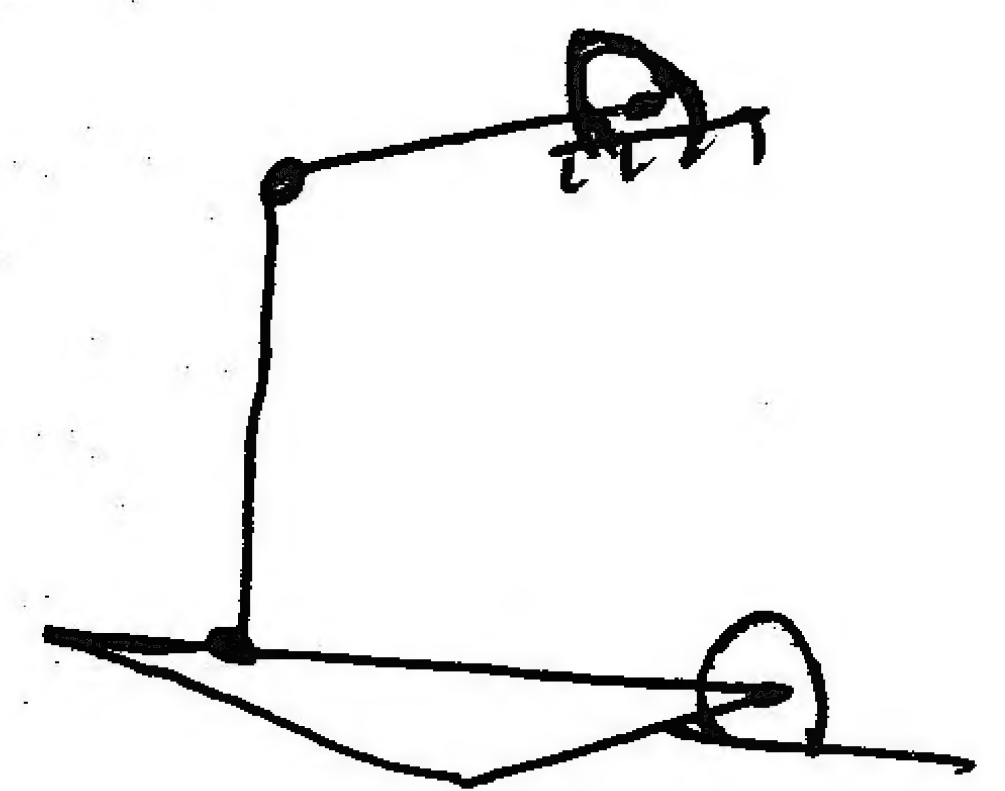
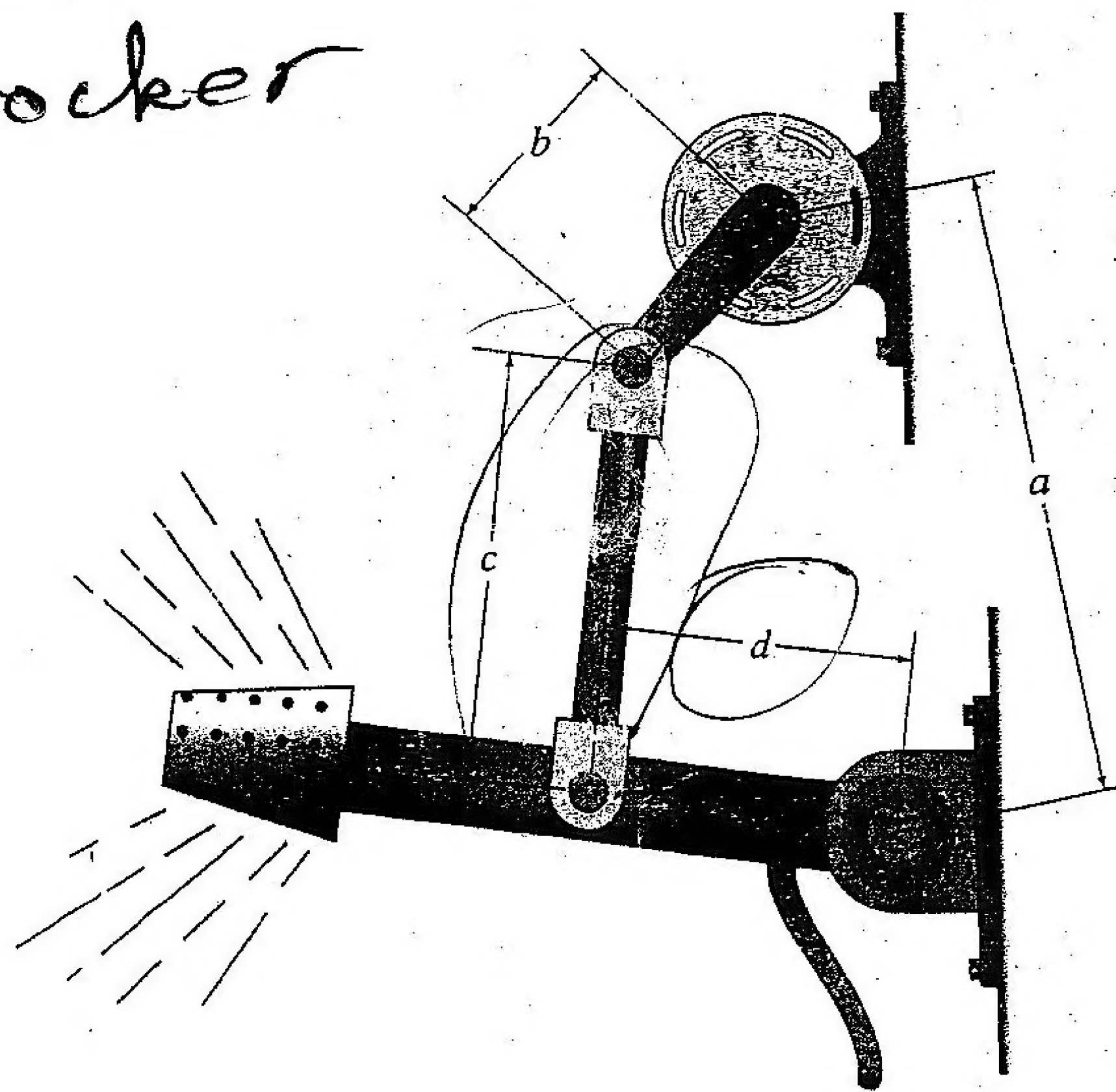
2- Classify this four bar mechanism, based on its possible motion, when the lengths of the

links are : 1-  $a = 12$  in,  $b = 1.5$  in,  $c = 14$  in and  $d = 4$  in

2-  $a = 12$  in,  $b = 5$  in,  $c = 12$  in and  $d = 4$  in

8 marks

1. crank rocker  
2. crank rocker



side → crank —  
rocker



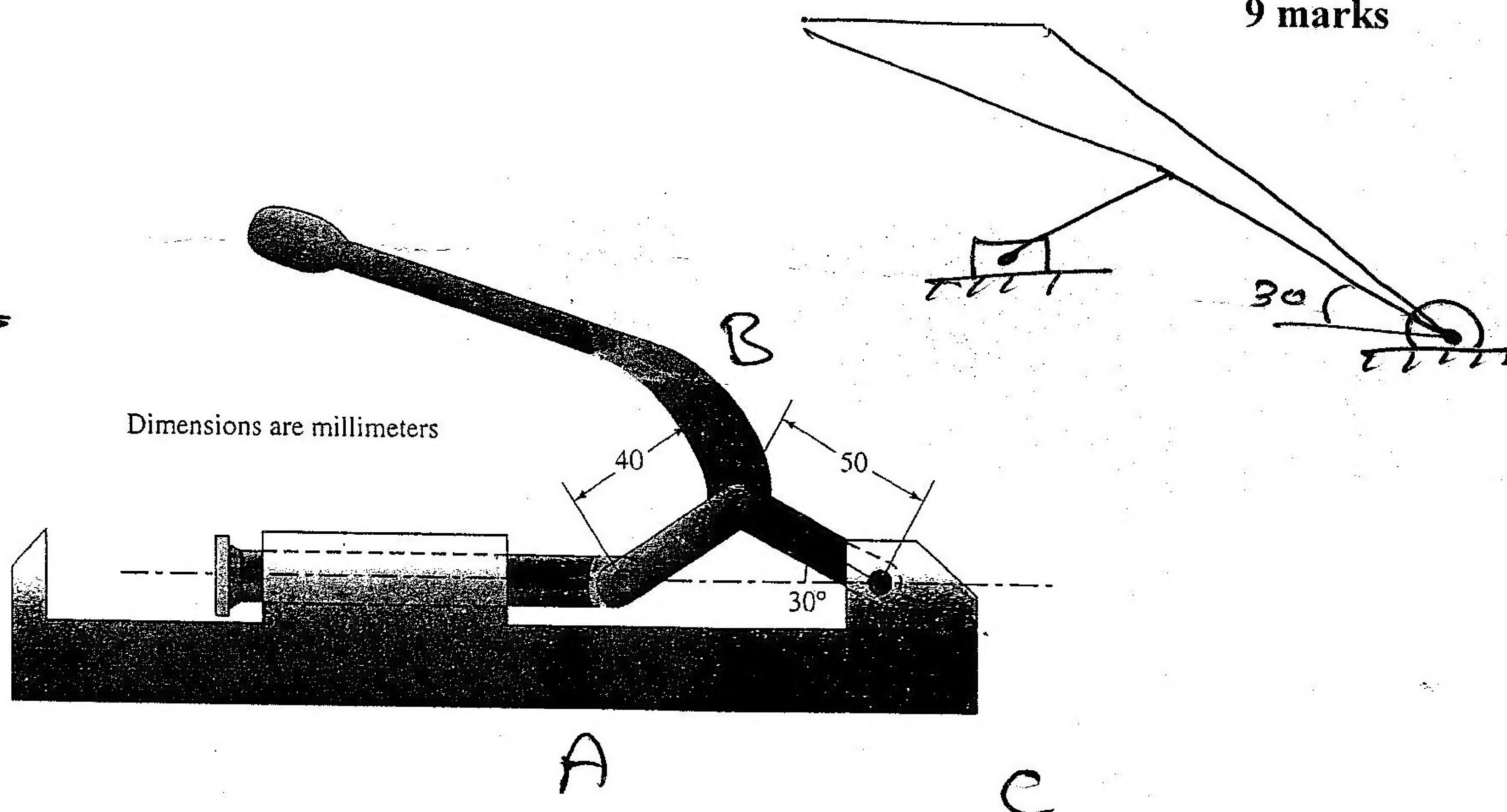
Q3. Toggle clamp mechanism shown is used to securely hold parts, draw the kinematic diagram for this mechanism.

Analytically determine the displacement of the clamp surface as the handle rotates downward (counterclockwise)

1-  $15^\circ$ .

2-  $30^\circ$

9 marks



$$AC = 74.53$$

$$A'C = 86.14$$

$$A''C = 90$$

$$11.61$$

$$15.47$$

